A COMPARISON OF THE IMPACT OF TWO KINDERGARTEN PROGRAMS ON THE CREATIVE PERFORMANCE OF DISADVANTAGED NEGRO CHILDREN

By

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In the past decade, numerous programs designed to enhance the intellectual functioning of disadvantaged children have been developed. The implicit aim of these programs is to discover and develop a fostering ethos in the classroom for intellectual and cognitive development. A comparison of the specifications for enhancing creativity with those designed to augment cognitive development suggests that one set of prescriptions conflict with the other and thus may stifle creativity.

The purpose of this study is to discover the impact of a special learning program designed to enhance cognitive development on the creative performance of disadvantaged Negro five-year-old children. Forty, five-year-old Negro children were selected from homes in the same disadvantaged neighborhood and divided into two groups roughly matched for sex, age, socioeconomic level and school readiness skills. One group was enrolled in the Learning to Learn

School in Jacksonville, Florida; the other in a public school kindergarten there. Measures were taken on these children at the beginning and end of the school year, utilizing the Stanford-Binet, and a Tinker Toy Test of Creativity to measure nonverbal creativity and three verbal tests to measure verbal creativity.

The hypotheses are:

1. Both groups will improve on the Stanford-Binet over time, but the Learning to Learn group (Group A) will be significantly higher on this metric than Group B.

2. The subjects in Group A will score significantly higher than the subjects in Group B on the creativity variables at the end of the school year.

3. The subjects in both groups will score significantly higher at the end of the school year on all measures than they did on the pretreatment testing.

Hypothesis one was confirmed except for the fact that Group B did not improve. Hypothesis two was partly confirmed. Group A scored significantly higher than Group B on only two of the six creativity variables, nonverbal, complexity, and verbal flexibility. Hypothesis three was only partly confirmed. Group A improved on only the IQ metric and nonverbal complexity; Group B improved on the nonverbal complexity and nonverbal flexibility.

The discussion focuses primarily on the perplexing result of increased variability of Group A's performance on several of the creativity measures. It is suggested that some aspects of creativity are helped by the special learning program whereas others are hindered.

The special learning program may tend to enhance both intelligence and creativity more than the traditional program, but this program also may hinder the development of some aspects of creativity.

INTRODUCTION

Until recently, creativity has been neglected as an important source of human potential by researcher and educator alike. The paucity of research on creativity up to 1950 was lamented publicly by Guilford. He examined Psychological Abstracts over the twenty-three year period preceding 1950, and, of the 121,000 titles listed, found only 186 articles definitely relating to the subject of creativity (Guilford, 1950). Educators have been somewhat more concerned with creativity, but even they did not begin to focus significantly upon its value until the post-Sputnik era.

Once creativity was recognized by researchers and educators as a valuable source of human potential, they began to ask the same questions about it that had been asked about intelligence and its development. Thus, a welter of research and commentary focused on the nature-nurture question, the identification of the very creative individual, the development and periodicity of creativity, its relation to other developmental variables such as personality, family background and attitudes, and to social-environmental variables (Dauw, 1966; Getzels and Jackson, 1962; Guilford, 1959; Wallach and Kogan, 1965; Torrance, 1962; Dentler and

Mackler, 1964; Parloff and Datta, 1965). Research also began to focus more on childhood populations and this research on the childhood manifestations of creativity was, in a sense, "recapitulating" the research on intelligence and intellectual development.

Research findings were quickly translated into prescriptions and proscriptions for the classroom. From the writings of primarily one man, E. Paul Torrance, have come recommendations for improving teacher attitudes, curriculum development, and administration so as to enhance the development of creativity in the classroom. Thus, a fostering ethos for creativity was to be created in the classroom (Torrance, 1962, 1964, 1965).

The recapitulating phenomenon referred to above has now progressed to the point at which similar kinds of research questions are being asked simultaneously of both creativity and intelligence. Relationships between the two types of potential have been explored by Getzels and Jackson (1962), and Wallach and Kogan (1965), among others. This study is likewise concerned with the simultaneous impact on intelligence and creativity of an experimental curriculum for disadvantaged children.

In the past decade, numerous programs designed to enhance the intellectual functioning of disadvantaged children have been developed. The implicit aim of many of these programs is to discover and develop a fostering ethos in the classroom for intellectual and cognitive development. But when one compares the specifications for enhancing creativity with those designed to augment cognitive development, contradictions and discrepancies are apparent. It may be possible, for example, that a highly structured curriculum, typically employed in enrichment programs for disadvantaged children, may stifle creativity. Alternatively, certain kinds of structured programs may have a more felicitous impact on creative performance than others. This study addresses itself to this problem; it asks whether or not programs designed to enhance the intellectual functioning of disadvantaged children achieve their end by stifling or augmenting the development of creative performance.

The specific purpose of this study is to gauge the impact, measured on performance indicators of potential creativity, of a special "learning-to-learn" program fashioned to enhance cognitive development. The Learning-to-Learn program (Sprigle, 1969) presently being conducted in Jacksonville, Florida, will be compared with a traditional kindergarten for two groups of disadvantaged five-year old Negro children.

Early Research on Creativity in Children

Although research on childhood creativity was not a major subject of study before 1950, some research had been done. This research was generally vague and impressionistic; it employed a variety of methodological approaches, and dealt with the periodicity, nurturance, inhibitors, and facilitators of creativity. While some form of artistic creativity was being measured by most of the early studies, the definitions utilized varied widely (Torrance, 1962). The methodology varied just as widely. Abramson (1927) used responses to inkblots and concrete observations; McCarty (1924) used drawings; Andrews (1930) used, among other measures, tachistoscopic tests; and Grippen (1933) utilized children's paintings and their verbalizations while painting.

The periodicity of creativity was approached from two different angles: the stages of the creative process itself, without reference to age; and the chronological development of creativity. Ribot (1906) conceptualized the development of the creative process in terms of a rivalry between reason and the imagination. He contended that reason develops later than the imagination, but eventually surpasses it at the end of adolescence. McMillan (1924) indentified three stages in the development of the imagination. During the first stage, the young child has a sense of beauty which serves as a short cut to knowledge. He confronts reality during the second stage; and during the third stage, he gradually integrates his ideal vision of the world with his perception of reality. Griffiths (1945) identified eleven stages in the creative drawings of children, ranging from a stage of undifferentiated scribble to the development of a theme by means of a series of pictures.

Chronology of development was also disputed in the early literature. Andrews (1930) discovered that total imaginative scores are highest between the ages of four years and four years-six months, with a sudden drop at age five when the child enters kindergarten. Grippen (1933), on the other hand, concluded that creative imagination rarely functions before the fifth year; while Vernon (1948) held out for the eleventh year as the beginning point of "constructive imagination." With such variety in methodology, terminology, and definition, it is quite possible that they are all correct.

Research on Creativity in Children Since 1950

The more recent research on childhood creativity has focused primarily on two broad issues; the identification of the manifestly creative child, and the relationship between the two sources of human potential, creativity and intelligence. To a lesser extent, research has been concerned with the chronological development of creativity.

E. Paul Torrance has conducted most of the research on childhood creativity in the classroom. One of his major concerns is the identification of manifestly creative children. Torrance defines creative thinking as:

> the process of sensing gaps or disturbing missing elements; forming ideas or hypotheses concerning them; testing these hypotheses; and communicating the results, possibly modifying and retesting the hypotheses (Torrance, 1962, p. 16).

On the basis of this definition, Torrance and his associates at the Bureau of Educational Research of the University of Minnesota have developed the Minnesota Tests of Creative Thinking, designed to measure such creativity factors as originality, flexibility, fluency, and problem-sensitivity. The test battery includes four non-verbal tasks using verbal stimuli, and about a dozen verbal tasks using verbal stimuli. These tests, which are usually used for purposes of identifying the manifestly creative child, have forms for students ranging from kindergarten to graduate school. The validity data for this battery are not always encouraging or even appropriate, but the tests do represent an attempt at systematization of measuring techniques in this area (Torrance, 1962).

From research based upon this battery, Torrance has found that creative children have three outstanding and differentiating characteristics: highly creative children, especially boys, have a reputation for having wild or silly ideas; their work is characterized by the production of ideas "off the beaten track, outside the mold"; their work is also characterized by humor, playfulness, relative lack of rigidity, and relaxation (Torrance, 1962). A similar picture obtains from the findings of Weisberg and Springer (1961), and Getzels and Jackson (1962). Proceeding from a somewhat different definition of creativity, Wallach and Kogan (1965) have arrived at essentially the same picture of the manifestly creative child. Defining creativity as associative fluency, flexibility, and uniqueness in the context of a defined task, they see the creative person as one who produces abundant and unique associations with a playful and permissive task attitude.

Torrance presents no data on the nature-nurture issue, but he implies throughout his writings that there may be genetic differences in creative potential among individuals. He also implies, however, that such genetic potential requires a benevolent atmosphere in which to develop (Torrance, 1964). His proposals for classroom changes are aimed at providing an optimal environment for the development of a child's inherent creative potential.

The comparison of creativity and intelligence has been a research topic which has created some controversy. Intuitively, there would appear to be a close relationship between different facets of mental functioning. Some, however, maintain that they are not different, but rather that creativity is a specialized form of intelligence. The research, however, reveals different relationships between these sources of potential.

Even before 1950, researchers had found little relationship between measures of these two abilities. In 1922, for example, Simpson felt the need for estimates of both kinds of potential implying their independence:

> By joining a creative test, such as we have outlined, with a "reproductive" test,

> we shall get a more accurate statement of the worth of an individual (Simpson, 1922, p. 235).

According to their various definitions of creativity, Torrance (1962), Getzels and Jackson (1962), and Wallach and Kogan (1965) concur with the view that creativity implies something more than what intelligence tests measure--indeed, that it involves substantially different thinking abilities than those measured by current ability tests. Their findings suggest that these thinking abilities differ in terms of their usual aim or purpose. For example, Getzels and Jackson (1962), who view intelligence and high creativity as two forms of cognitive giftedness, make such a distinction:

> The one mode tends toward retaining the known, learning the predetermined, and conserving what is. The second mode tends toward revising the known, exploring the undetermined, and constructing what might be (Getzels and Jackson, 1962, pp. 13-14).

Guilford makes a similar distinction in his description of two kinds of productive thinking:

> In divergent thinking operations we think in different directions, sometimes searching, sometimes seeking variety. In convergent thinking, the information can and does lead to one right answer or to a recognized best or conventional answer (Guilford, 1962, p. 160).

The recent and more systematic research on these two modes of thinking has tended to confirm the earlier view, that they do differ substantially, as measured by IQ and creativity tests. Presently, it is accepted that IQ and creativity test scores show medium correlations around .3, except at the higher end of the IQ distribution where the correlation is about zero (Guilford and Hoepfner, 1966; Yamamoto, 1964; Getzels and Jackson, 1962; and Torrance, 1962). More recently, however, it has been found that creativity involves more than divergent thinking operations, including convergent thinking operations as well (Guilford, 1967). The fact that creativity stands somewhat apart from intelligence as another kind of important mental ability, which may require different educational techniques and conditions to foster it, suggests that changes may be necessary in many aspects of the educational establishment to accommodate this new information.

Educational Implications of the Research on Creativity

As research revealed hidden sources of human potential and the conditions which foster their development, researchers and educators alike began to examine the educational theories and practices which currently prevail in the schools. Many realized that once creativity is viewed within the framework of human potentialities, capable of being nurtured and possibly accelerated, the schools become a relevant agency for such nurturance and acceleration. In so viewing creativity, however, the schools were also required to make their own peace with the nature-nurture issue:

> The efforts of educators to augment the creative output of their students rests on three assumptions:

> (1) that everyone has some measure of creative ability; (2) that such abilities as the individual possesses are capable of being developed by practice; (3) that such training is a proper function of the school (Gowan, Demos, and Torrance, 1967, p. 5).

But once educators accept these assumptions about the nature-nurture issue in creativity, they are confronted with a knotty problem. As we have just shown, the research on creativity and creative thinking indicates that academic excellence may be attained by two different modes of thinking; it therefore may require different and perhaps antagonistic educational practices to achieve or increase it. In short, the research suggests that the educational practices designed to achieve intellectual excellence may do so at the expense of creativity. Gowan et al. (1967, p. 6) give voice to this view and to the problems it poses for education:

> This educational problem of producing achievement and productivity without sacrificing originality and creativity is a serious and enlarging educational issue, for which there is no immediate and ready answer. American public education must face this issue squarely in the coming decade.

One way to confront this issue is to compare the fostering ethos for creativity with that for cognitive and intellectual development. For the explication of the former, we rely primarily on Torrance's recommendations for changes in the classroom to benefit the manifestly creative child.

For the latter, we will consider briefly the literature on enrichment programs designed to enhance the cognitive or intellectual functioning of the disadvantaged child.

In several publications, Torrance (1962, 1964, 1965) has reviewed most of the relevant research on creativity in children and, based upon the findings, has generated many specific hypotheses with regard to possible changes in curricula, teacher attitudes and administrative procedures. Although Torrance seems to accept the view that creativity is an ability capable of being influenced by environmental interventions rather than one which emerges by itself out of the genetic composition of the individual, he focuses on the manifestly creative child who is already functioning at the upper ends of both the intelligence and creativity distributions. Thus, his criticisms of the schools do not deal so much with their neglect in stimulating latent creativity in all students as they do with the school's abuse and neglect of children who are already showing a high level of creative performance.

In the area of teacher attitudes, his recommendations to teachers include the following five suggestions for rewarding creative behavior:

> 1. Be respectful of unusual questions.
> 2. Be respectful of imaginative, unusual ideas.
> 3. Show your pupils that their ideas have value.
> 4. Occasionally have pupils do something "for practice" without the threat of evaluation.
> 5. Tie in evaluation with causes and consequences. (Torrance, 1965, p. 43).

It is more difficult to exemplify precisely Torrance's suggestions for curricular changes because he has been less explicit in this area, and the statements he has made refer to changes at the elementary and secondary school levels. At these levels, he has suggested self-initiated learning experiences, original projects, exercises in creative applications and decision-making, and the critical and creative reading of research articles. These suggestions would be more meaningful if they could be scaled down to apply to the teaching of kindergarten children.

Implicit in Torrance's suggestions and those of other commentators are several recurring ideas for improving the creative performance of children. Active self-directed learning is encouraged. Opportunities for verbal elaboration, exploration, and playful experimentation with ideas, objects, and events are considered crucial. A de-emphasis on teacher evaluation of the child and on the necessity for the child to produce "right" or conventional answers are typically encouraged. Thus, opportunities for the development of divergent--as well as convergent--thinking are urged.

In summary, it may be said that researchers and educators are beginning to develop the ways and means for identifying the manifestly creative child; and they have the information to make the necessary adjustments in the school situation to nurture, sustain, and enhance his creative functioning. The question arises, however, whether the ways and means developed with this group of children are relevant to the development of creativity in all children. Such an assertion is implicit in the writings of Torrance (1965), Getzels and Jackson (1962), Wallach and Kogan (1965), Barron (1957), and Parloff and Datta (1965). If so, then the further question arises--whether or not the special learning programs for disadvantaged children contain the kinds of educational practices found to be valuable with creative children. To answer this question, we will briefly review some of the literature on disadvantaged children, concerned with enrichment programs designed to augment cognitive development or to raise the IQ.

Characteristics of Disadvantaged Children

In this study, the term disadvantaged is used to describe a class of children whose relative position in American society finds them wanting in the material and psychological benefits attainable in the society. In the literature on this group of children, a variety of terms are used to describe them. Including "culturally deprived," "culturally different," "impoverished," "socially disadvantaged," and "culturally disadvantaged." These terms refer to children of all races and creeds, but most often they apply to children of such minority groups as Negroes, Mexicans, Puerto Ricans, and Indians. The major Anglo-Saxon group contains the poverty-stricken children of the people of Appalachia. The disadvantages and deprivations usually mentioned in a description of these children include poverty, poor physical health, inferior status, the stigma of being of a lower class or of being segregated from the mainstream of American life, and attending inferior schools manned by inferior teachers. Other liabilities experienced by these children include those generated within their particular reference groups, such as anti-intellectualism, a negative attitude toward education, and a distrust of individual accomplishment (Bloom, Davis, and Hess, 1965). The author will use the term disadvantaged and have it apply in a limited context, referring to the child's limited access to the experiences and material resources which help prepare him for a successful experience in the public school system as it now functions.

Van De Riet, Van De Riet, and Sprigle (1968) point out that a large body of research has accumulated supporting the hypothesis that cultural deprivation leads to intellectual inferiority. Krugman (1961) found that disadvantaged children had lower IQs and reading test scores than middle class children, and in comparing third-graders with sixth-and eighth graders, the deficits were seen to be cumulative. Deutsch (1963) has set forth his "cumulative deficit hypothesis." He argues that the lower class child is less well-prepared for school than the middle class child and that the initial failures begin a pattern which increases over time.

When researchers attempt to pinpoint the nature of the deprivations or disadvantages and their antecedents, they encounter a severe difficulty. Most disadvantaged children happen to be Negro; all disadvantaged people occupy the lower income brackets. A confounding of class and race variables thus enters into any consideration of the deficits these children experience. Black children experience the liabilities of segregation and race prejudice as well as the limitations associated with lower class status. Bloom, Whiteman, and Deutsch (1963) found some evidence, however, to suggest that social class is a more potent variable than race in predicting attitudes.

The nature of the deficits and their antecedents has been a frequent topic of research, and one which has stirred a good deal of controversy. Bernstein (1960) analyzed social class differences in language usage; in the process, he arrived at a meaningful distinction between two language types, the restricted and the elaborated. A family which employs restricted language gives a child a language environment characterized by short, grammatically simple sentences rife with clichés, little use of subordinate clauses, repetitive use of the conjunctions "so," "then," and "because," and a rigid and limited use of adjectives and adverbs. A family which employs an elaborated language gives a child a language environment characterized by complex, grammatically accurate sentences, frequent use of the personal pronoun I, and varied use of adjectives and adverbs. It is a language usage which points to the possibilities inherent in a complex conceptual hierarchy for the organizing of experience.

A child who has learned a restricted language at home is likely to have difficulty in school, where teachers typically use an elaborated language; and the difficulty of the child is likely to increase as he goes further in school unless he learns the elaborated language. Conversely, a child who has experienced an elaborated language at home adapts readily to the school situation.

Deutsch (1963) moves back and forth between the semantic and sensory levels to seek the most basic features of the disadvantaged child's limitations. He finds them to have inferior auditory and visual discrimination, inferior judgment concerning time, number, and other basic concepts. This, he maintains, is not due to organic defects, but rather is due to inferior habits of hearing, seeing, and thinking.

Ausubel (1965) concurs with Deutsch that the effects of deprivation include poor perceptual discrimination skills, inability to use adult sources of information, correction, or reality testing, an impoverished language system, a paucity of information, concepts and relational propositions. But the greatest deprivation is in the area of abstract thinking.

Riessman (1962) offers a somewhat dissenting view of disadvantaged children, pointing to their strengths as well as their weaknesses. There is much in their cultural background, he maintains, which is edifying, such as their general freedom from self-blame, their equalitarianism, informality, and humor. Their conceptual weaknesses are often a matter of conceptual style rather than a decided limitation. For example, he states that these children can think abstractly, but that this is not characteristic of the conceptual style they encounter in their environment. Their perceptual orientation is physical and visual rather than aural, content-centered rather than form-centered, problem-centered rather than abstract-centered. They are externally oriented rather than introspective, inductive rather than deductive, and spatial rather than temporal. Deprived children are typically slow, careful, and persevering in areas of importance, rather than quick, facile, and flexible; they have a definite lack of formal language skills, but a highly developed informal language and gestures.

There appears to be a consensus, though by no means unanimity, in the view that the deprivation is primarily in the area of semantics, and particularly manifests itself in the area of abstract thinking. It may well be as Hess and Shipman (1965) maintain, that "the meaning of deprivation is a deprivation of meaning."

Special Learning Programs for Disadvantaged Children

According to Jensen (1969) compensatory education programs have been based primarily on two guiding ideas--the "average children" concept and the "social deprivation" hypothesis. Both notions point to the prepotent influence of environmental variables on the variations obtained on intelligence tests. The former notion contends that all children, save those born with neurological deficits, are much alike in their mental abilities and that the differences between children observed in the schools are due to differences in upbringing, preschool and out-of-school experiences, motivations, interests, and the educational influences at home. Interventions should be leveled at these areas, and the average child will respond with accelerated achievement. The social deprivation hypothesis is in some sense a corollary of the average child concept. It maintains that children of impoverished families or of certain ethnic minorities do relatively poorly in school because they begin school lacking certain crucial experiences referred to in the preceding section which make for school success. Some programs aim at a generalized raising of the IQ, others focus on improving specific academic skills. IQ measures and measures of scholastic achievement are the usual means of evaluating such programs.

Hodges and Spicker (1967) have summarized a number of such programs and the following are some examples:

The Indiana Project focused on deprived, Appalachian, white children, five years of age, with IQs ranging from 50 to 85. They spent one year in a special kindergarten with a structured program designed to remedy certain language deficiencies. After two years, the average gain of the experimental group over three control groups was 11 points on the Stanford-Binet (Hodges and Spicker, 1967).

The Perry Preschool Project at Ypsilanti, Michigan, focused on disadvantaged children with similar IQs. The program focused on verbal prerequisites for the first grade learning and involved parents as well as the children. There was a significant gain of nine points on the Stanford-Binet after one year of preschool, but by the end of the second grade, the experimental group exceeded the controls, who had had no preschool attendance, by only 1.6 IQ points (Jensen, 1969).

The Early Training Project developed by Klaus and Gray (1968), was a multiple intervention program involving children and their mothers, to increase their ability to stimulate their children's cognitive development at home. Two experimental groups, with two and three summers of preschool enrichment experience in a special school, plus home visits by the training staff, experienced an average gain of 7.2 IQ points over a control group on the Stanford-Binet.

The University of Illinois Program developed by Bereiter and Engelmann (1966) focused on specific cognitive skills believed to be responsible for school success. They contrast their program with the more diffuse "verbal bombardment" approach of Weikart's (1964). This preschool provided the children every day with twenty-minute periods of intensive instruction in three major content areas--language, reading, and arithmetic. The instruction was typically carried out in small groups and involved maintaining a high level of attention, motivation, and participation for every child. The average gains on the Stanford-Binet over an 18-month period were about eight to ten points. Larger gains were found on tests which reflect the content of training. While Jensen criticizes this use of evaluation measures which directly relate to content, Bereiter and Engelmann maintain that they wish to teach specific congnitive skills rather than specifically raise IQ.

The Higher Horizons Program in New York, was ultimately not very effective. After three years of the program, the children in it showed little average gain (Jensen, 1969). Martin Deutsch's intensive enrichment program at the Institute of Developmental Studies in New York showed little gain for the experimental group on IQ, but somewhat more on scholastic measures (Powledge, 1967). Karnes' program at the University of Illinois produced the largest gains in IQ reported in the literature. The program was aimed at specific learning deficits, and it produced IQ gains on the Stanford-Binet of almost 17 points (Karnes, 1968).

These programs typically produce IQ changes in the five and ten point range, but they show even more effect on scholastic achievement measures, especially when the programs hone in on specific skills. Thus, the more structured and focused programs appear to be more effective in improving the cognitive skills of disadvantaged children. In terms of the present discussion, these programs may be said to have a convergent bias. In other words, these programs are structured so that the majority of the demands imposed upon the child require him to respond with correct or conventional answers. Thus, the convergent, cognitive facility rather than the divergent mode of thinking, seems to be the focus of enrichment programs. What Lenrow (1967) refers to as the convergent mode of coping, expresses rather precisely the kind of ethos which apparently prevails in such programs as the programs of Bereiter and Engelmann, and Martin Deutsch:

> The convergent mode of coping is most clearly occasioned when an authority imposes demands on the child which call for focused and sustained attention, efforts to understand what behavior is called for, persistent attempts to perform this behavior, and suppression of irrelevant or competing responses (Lenrow, 1967).

Moreover, the convergent bias of these programs is revealed in the particular curricula employed. Little in the way of self-initiated learning experiences is provided by these programs, and few attempts are made to provide opportunities for the child to employ divergent thinking.

The preceding review of the literatures on manifestations of childhood creativity and enrichment programs for disadvantaged children provides a general idea of what is considered to be a fostering classroom ethos for enhancing creativity and intellectual functioning, respectively. It has been suggested that the experiences and structure which typifies the classroom benefiting intellectual development for disadvantaged children may impede the development of creativity in these same children. The ethos of the former has been described as characterized by a convergent bias, while the ethos for fostering creativity has been characterized by a divergent bias. One study (Lenrow, 1967) has attempted to provide empirical data to support such an interpretation.

Lenrow tested the effect of several preschool programs on the development of the convergent and divergent cognitive modes in both disadvantaged and non-disadvantaged children. Three programs, emphasizing the facilitation of one or neither of the two cognitive modes, were employed. The programs were labelled _convergent training_, _divergent training_, or _minimal training_, according to the particular _emphasis_ of the program and the _degree of directive teaching_ and curriculum structure present. The convergent training program emphasized logical thinking, with a high degree of directive teaching and a highly structured curriculum which "repeatedly engaged the child in operations that are characteristic of logical thinking" (Lenrow, 1967, p. 5). The divergent training emphasized intrinsic motivation in order to foster independent and imaginative coping. It entaled considerable adult control in setting-up the facilities and the sequence of activities, but the structure was designed to encourage autonomous exploration activity. The divergent training differed from the minimal training in the degree of structure. It also provided for the presentation of materials and activities in sequences of increasing creativity. There were twenty-five children, between the ages of four-and-a-half and five-and-a-half, in each group; half of the subjects in each group fit the disadvantaged classification while the other half came from higher income levels with more highly educated parents. Rather than use measures of creative performance, Lenrow used Q-sort ratings, by independent pairs of trained observers, of the child's most and least salient ways of coping with standard situations. He also employed a brief test of logical thinking--the Stanford-Binet--and a standard free play situation. The training periods lasted for eight-and-a-half weeks. Lenrow found that the mean gains on the divergent mode did not significantly differ among the three training groups.

Although the dispersion of change scores was significantly greater for the convergent training group than for the divergent training group, the changes were not all in one direction. Some children apparently responded to convergent training with substantial gains in the divergent mode while others experienced losses in this area. Lenrow did find, however, that children who gained (under the directive conditions of convergent training) in their performances on logical thinking more often gained in the divergent mode of coping. He has reported no evidence yet of socio-economic differences. This evidence supports the contention that special training programs with a convergent bias do not _systematically_ increase the more intellective modes of functioning at the expense of creativity. Indirectly, Lenrow's study suggests that structure alone may not suppress creativity in enrichment programs. Rather, the nature of the structure in a given program may be a critical variable. A program can be structured and yet include within it curricular prescriptions which foster creativity.

This study is concerned with this problem. Specifically, the purpose of this study is to gauge the effect of a special "Learning to Learn" educational curriculum, designed to stimulate intellectual development, on the creative performance of disadvantaged Negro children. The Learning to Learn program which provides the source of data for this study was developed by Sprigle (1969). The program was initiated in response to the recent empirical findings in developmental research which suggest that learning follows an orderly sequence of growth proceeding from motor to perceptual to symbolic levels (Bruner, 1966; Havighurst, 1953; Hunt, 1961; and Piaget, 1963). Seven principles underlie the program:

1. The child must be an active participant in the acquisition of knowledge and must be given a major share of the work in what he learns.
2. The child must receive feedback that the application of his knowledge makes a contribution to himself and someone else.
3. The internal satisfaction and feelings of adequacy which develop from the knowledge that he can cope with and master his environment stimulate the child's growth toward independence and achievement.
4. Learning becomes alive and more meaningful to the child when it is put into the form of a problem that poses a challenge and sparks his curiosity.
5. For learning to become a permanent part of the child's repertoire it must be immediately useful in his everyday behavior.
6. The child must be exposed to learning materials and situations which provide the opportunity for the interaction of multiple sensory and motor activities and for the accurate labeling and communication of the information received.
7. The timing, continuity, and structuring of learing experiences are more important than the simple exposure to them.

In order to make the above principles operational, the curriculum is built upon a series of developmental tasks which emphasizes manipulating, organizing, classifying, and ordering objects and ideas. The content of the curriculum is a carefully planned sequence of experiences, reflecting the stages of cognitive growth mentioned above. Each learning experience has some continuity with learning experiences to follow. The tasks are sequenced to lead the five year old child to an understanding and mastery of new information and situations based on previous learning.

Teachers provide a game-like atmosphere as well as interesting materials, and their major functions are to pose problems for the children, to ask questions, and to stimulate interest and curiosity. The program is designed to motivate children to become active in the learning process, to make their own discoveries, formulate their own questions, and learn from their own activities, observations, and formulations. Two teachers and two classrooms are employed. One classroom accommodates a class involved in a variety of activities, monitored by one teacher. A smaller room is used by another teacher for brief sessions of planned, sequential activities (Van De Riet, Van De Riet, and Sprigle, 1968-69).

There is evidence that this program, as compared with a traditional kindergarten, can produce gains in the intelligence, achievement, and social maturity of disadvantaged five year old children. Van De Riet, Van De Riet, and Sprigle (1968-69) studied seventy-two disadvantaged Negro five year old children from Jacksonville, Florida, divided them into three matched groups, and, at the end of the program, tested them on nineteen developmental measures--including the Stanford-Binet, Metropolitan Readiness Test, the Illinois Test of Psycho-linguistic Abilities, and the Bender Motor Gestalt Test. The group participating in the Learning to Learn program achieved significantly higher scores on all measures than did either the group exposed to traditional methods of kindergarten teaching or the group which received no formal program.

While this program seems to possess a typically convergent bias, there are reasons to expect that it would enhance creative as well as intellectual performance. At this low average level of achievement and intelligence, IQ and creativity are substantially correlated; thus, any increase in intelligence and achievement should, in part, produce a corresponding increase in the level of creative performance. Also, the Learning to Learn program puts a clear emphasis on self-discovery and self-initiated learning, which many investigators (Torrance, 1962; Bruner, 1961; Wallach and Kogan, 1965) feel to be prerequisites for creative performance. Along with the emphasis on self-discovery, there is the correlative concern with independence of judgment which Barron (1957) and others have shown to be related to creative performance. Finally, the structuring of the curriculum itself may be a facilitator rather than a hindrance to creative development--because guidance along creative tasks appears to be more beneficial to creative development than undirected freedom (Bereiter and Engelmann, 1966; Torrance, 1964).

By contrast, the traditional program with which the Learning to Learn program is compared, emphasizes socialization and psychological well-being, and is less directly concerned with cognitive growth and active learning. The most salient kinds of activities in the traditional kindergarten include music appreciation, nature study, cutting-and-pasting, drawing, coloring, vocabulary building, and listening to stories. The rationale of this program can be found in a treatise on kindergarten by Rudolph and Cohen (1964). The authors conceive of kindergarten children as not yet "ready" to take on the task of symbolic learning. Thus the teacher's task is to focus on concrete experience and sensory learning so as to build a foundation for later symbolic learning. Another striking difference in this program is its lack of systematization of the curriculum, which challenges the basic premise of the Learning to Learn program. The authors' rationale is succinctly presented in the following:

> Unhampered by a tightly prescribed course of study, the kindergarten teacher is in a position to concentrate on the quality of experience in a child's life and on the stretching of his mind so he will be ready to read later. Kindergarten is the time to find out that wanting to know is exciting, stimulating, and fulfilling. It is a time to ask questions, seek answers wherever they are to be found, and exchange ideas, knowledge, and impressions . . . . The kindergarten teacher makes it possible for the children to explore, examine, test, and understand that which is reality to a five-year-old. Only in this way, by building understanding of what his senses contact, will the child truly be ready for the symbolic learning that will come in time (Rudolph and Cohen, 1964, pp. 9-10).

Aside from the fact that, according to Sprigle (1969), the traditional program is not adequate to the task of remedying the educational deficits of disadvantaged children, there also seems little in this program to stimulate their creative performance. It is to be expected then that the Learning to Learn program would enhance creative performance in disadvantaged children to a significantly greater degree than the traditional kindergarten program.

Creativity and Disadvantaged Children

In a recent review, Dellas and Gaier (1970) maintain that, despite differences in cultural background and age, a particular cluster of psychological and cognitive traits continues to characterize the creative person. Among the intellectual factors which continually appear in the creativity literature are fluency, flexibility, cognitive complexity, and originality. These factors characterize people who are both verbally and non-verbally facile and productive, who seem to process a greater degree of environmental complexity and who possess a flexibility of cognitive set. Creative products are characterized as enriched and novel productions which have some social value. It is hoped that the semantic essence of these concepts will be retained and yet be scaled down to apply to disadvantaged five-year-old children.

Starkweather (1964) has pointed out the sizeable measuring problems involved in dealing with young children. She suggests, in fact, that the experimenter himself must exhibit evidences of creativity such as patience, flexibility, and ingenuity in setting up testing procedures for very young children. The major problem, however, is the designing of instruments appropriate to the preschool level of maturity. Measures of creativity devised for this study are more accurately interpreted as indicators of potential creativity, for they are scaled down measures of the most characteristic variables associated with creative performance.

METHOD

Subjects

The subjects consisted of forty disadvantaged, Negro, five-year-old children from Jacksonville, Florida. The children were divided into two groups, matched as well as possible on the basis of socio-economic level, cultural background, age, sex, and school readiness skills. The children from both groups were selected from homes in the same disadvantaged neighborhood. Almost all of the parents of these children were employed at an occupational level below white collar worker. The children were matched as closely as possible in school readiness skills by means of the School Readiness Screening Test, and Two subtests from the Illinois Test of Psycholinguistic Ability.

Measuring Instruments

The instruments include the Stanford-Binet Intelligence Test, a tinker toy test of creativity, developed by the author to measure non-verbal creative performance, and three tests of verbal creative performance, including modifications of two tests from the Minnesota Tests of Creative Thinking.

Tinker Toy Test

This measure of non-verbal creativity involves placing before the subject twenty pieces from the Tinker Toy set, instructing him to make any design he wishes with any number of pieces he cares to use. Furthermore, he is told to make as many designs as he likes and to notify the experimenter when he is through. Fluency, flexibility, and complexity scores are obtained from this measure.

Just Suppose Test

This measure of verbal creative performance was adapted from the Minnesota battery. The children are shown a drawing of clouds with strings hanging down from them to the earth. They are asked to look at the picture and to describe what might possibly happen if clouds had strings. Secondly, the children are asked to stretch their arms and legs as far as they can. The experimenter then asks the children to think of objects, animals, or people that they could become if they could stretch their bodies in any direction. Fluency and flexibility scores are obtained from this measure.

Unusual Uses Test

This verbal measure is also an adaptation of one of the Minnesota tests. The children are shown a shoe and an ashtray. They are first asked to give the typical use of these objects and then are asked to try and think of other ways in which these objects might be used. This test provides measures of verbal fluency and flexibility.

Imaginative Stories

In this task, subjects are instructed to tell the most interesting and exciting story they can about one of two topics. One topic involves a little boy or girl who does not get his or her supper one evening; the other topic focuses on a child finding a bag of money in the street. The topics are thought to reflect distinct possibilities in the lives of these children.

These six creativity variables--non-verbal fluency, non-verbal flexibility, non-verbal complexity, verbal fluency, verbal flexibility, and verbal originality--representing as they do verbal and non-verbal measures of creative performance, are expected to be scaled-down measurements of factors of creativity frequently reported as definitive of creativity. Because it is premature to offer an elaborate definition of creativity for children of this age, these factors should be taken as indicators of creative potential. The assumption is that development along the dimensions of fluency, flexibility, complexity, and originality represents the best predictors of later creative performance.

Procedure

The forty subjects were divided into two groups of equal size, Group A and Group B. The children in Group A participated in the Learning to Learn program while those in Group B participated in a traditional kindergarten experience. Testing of the children in the Learning to Learn program took place at the Learning to Learn School in Jacksonville, Florida; testing of the children in Group B took place at Pine Forest Elementary School in Jacksonville.

In October of 1968, each subject was administered the Stanford-Binet, the Tinker Toy Test of Creativity, the Just Suppose Test, the Unusual Uses Test, and the story. The testing conditions, however, were not identical. At the Learning to Learn School, the experimenter used a room adjacent to the main school room; the children had only to walk a few paces to get to it. At Pine Forest Elementary School, the selected children were enrolled in two different kindergarten classes, each with 25 students. The testing was done in the suite of administrative offices in the school. This meant that each child had to be called out of the classroom on the public address system and accompanied some distance to the administrative offices by a teacher aide.

During the middle of the school year, each class in which the subjects participated was observed for a three-hour period in order to ascertain any differences that appeared in the classroom situation or in the quantity and quality of teacher-children interactions. No psychometric device was used; instead, clinical impression formed the basis of these observations. Differences in curricular emphases were particularly noted. Near the end of the school year, measures were obtained on the same IQ and creativity instruments.

Hypotheses

1. Both groups will achieve higher test scores on the Stanford-Binet over time, but Group A will be significantly higher on this metric than Group B.

2. The subjects in the Learning to Learn Group (Group A) will score significantly higher that the subjects in the traditional kindergarten group (Group B) on the creativity variables administered at the end of the school year.

3. The subjects in both groups will score significantly higher at the end of the school year on all measures than they did at the time of the first test administration.

RESULTS

The measures taken in the beginning of the school year indicated that the mean scores of the two groups did not differ significantly on the Stanford-Binet; both groups obtained a mean IQ of about 90. However, the groups did differ significantly on two of the six creativity measures--nonverbal flexibility and nonverbal complexity. Table 1 indicates that the children in the Learning to Learn group obtained significantly higher mean scores on these variables than the traditional group.

TABLE 1

PRE-TREATMENT MEAN DIFFERENCES ON IQ AND CREATIVITY VARIABLES BETWEEN LEARNING TO LEARN GROUP (GROUP A) AND THE TRADITIONAL KINDERGARTEN GROUP (GROUP B)

	Group A		Group B			
	X	Sd.	X	Sd	*t*	*p*
Stanford-Binet IQ	90.00	9.68	89.45	8.35	.50	n.s.
Nonverbal Fluency	4.10	1.37	3.25	1.48	1.89	n.s.
Nonverbal Flexibility	3.60	2.35	2.00	1.41	3.81	$<.002$
Nonverbal Complexity	9.62	4.45	6.07	3.90	2.56	$<.02$
Verbal Fluency	5.10	3.33	2.70	3.38	1.95	n.s.
Verbal Flexibility	1.15	1.31	.65	1.39	1.11	n.s.
Verbal Originality	1.05	1.20	.55	1.43	1.14	n.s.

Degrees of Freedom = 38

$N_1 = 20$

$N_2 = 20$

These differences necessitated a multivariate analysis of covariance on the measures taken near the end of the school year in order to remove the influence of the pretreatment differences. Table II indicates that the adjusted mean scores of the Learning to Learn group were significantly greater than those of the traditional group on the Stanford-Binet and two of the six creativity variables, nonverbal complexity and verbal flexibility.

TABLE II

POST-TREATMENT ADJUSTED MEAN DIFFERENCES ON IQ AND CREATIVITY VARIABLES BETWEEN LEARNING TO LEARN GROUP (GROUP A) AND TRADITIONAL KINDERGARTEN GROUP (GROUP B)

	Group A		Group B			
	X	*Adj. S.E.	X	*Adj. S.E.	F	p
Stanford-Binet IQ	98.95	2.03	88.55	2.03	13.15	$<.001$
Nonverbal Fluency	4.03	.45	4.52	.45	.58	n.s.
Nonverbal Flexibility	4.25	.56	4.05	.56	.06	n.s.
Nonverbal Complexity	14.22	1.15	10.25	1.15	5.49	$<.05$
Verbal Fluency	7.28	1.34	4.22	1.34	2.46	n.s.
Verbal Flexibility	2.34	.57	.61	.57	4.47	$<.05$
Verbal Originality	.81	.17	.79	.17	.01	n.s.

Degrees of Freedom = 1, 37

$N_1 = 20$

$N_2 = 20$

*Adjusted Standard Error

Tables III and IV show that when pre and post-treatment means are compared for each group, that the Learning to Learn group significantly improved on only the IQ metric and the nonverbal complexity metric. The traditional group improved significantly on only two nonverbal creativity measures, flexibility and complexity. Neither group improved significantly on any of the measures of verbal creativity. On the Stanford-Binet, the traditional group not only did not significantly improve, but, in fact, decreased a point. Figures 1-7 graphically represent these mean changes.

TABLE III

PRE AND POST-TREATMENT MEAN DIFFERENCES FOR THE LEARNING TO LEARN GROUP (GROUP A) ON THE IQ AND CREATIVITY MEASURES

	Pre		Post			
	X	Sd.	X	Sd.	t	p
Stanford-Binet IQ	90.00	9.68	99.20	11.05	2.72	$<.02$
Nonverbal Fluency	4.10	1.37	4.25	2.05	.26	n.s.
Nonverbal Flexibility	3.60	2.35	4.80	2.60	1.50	n.s.
Nonverbal Complexity	9.62	4.45	14.61	4.26	3.51	$<.002$
Verbal Fluency	5.10	3.33	7.15	6.95	1.24	n.s.
Verbal Flexibility	1.15	1.31	2.30	3.35	1.39	n.s.
Verbal Originality	1.05	1.20	.85	.73	.65	n.s.

Degrees of Freedom = 38

$N_1 = 20$

$N_2 = 20$

TABLE IV

PRE AND POST-TREATMENT MEAN DIFFERENCES FOR THE TRADITIONAL KINDERGARTEN GROUP (GROUP B) ON THE IQ AND CREATIVITY MEASURES

	Pre		Post			
	X	Sd.	X	Sd.	t	p
Stanford-Binet IQ	89.45	8.35	88.30	12.77	.33	n.s.
Nonverbal Fluency	3.25	1.48	4.30	2.05	2.00	n.s.
Nonverbal Flexibility	2.00	1.41	3.50	2.71	2.24	.05
Nonverbal Complexity	5.07	3.90	9.87	5.34	3.17	.002
Verbal Fluency	2.70	3.38	4.35	3.84	1.40	n.s.
Verbal Flexibility	.65	1.39	.65	.91	.00	n.s.
Verbal Originality	.55	1.43	.75	.77	.48	n.s.

Degrees of Freedom = 38

$N_1 = 20$

$N_2 = 20$

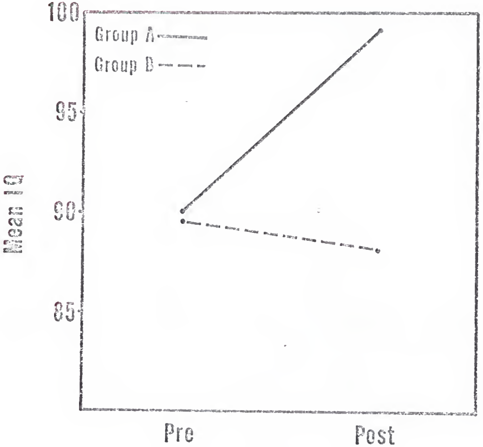

Figure 1

Changes in Mean IQ Scores for Groups A and B

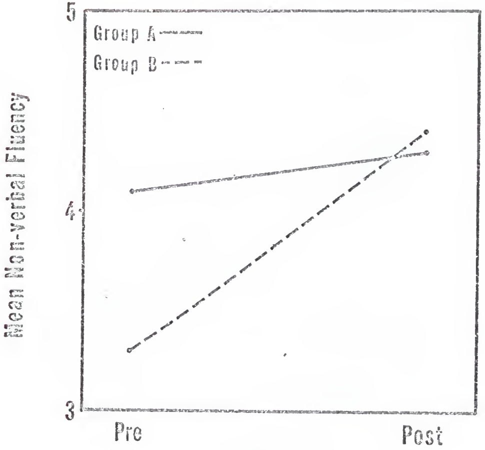

Figure 2

Changes in Mean Non-verbal Fluency Scores
for Groups A and B

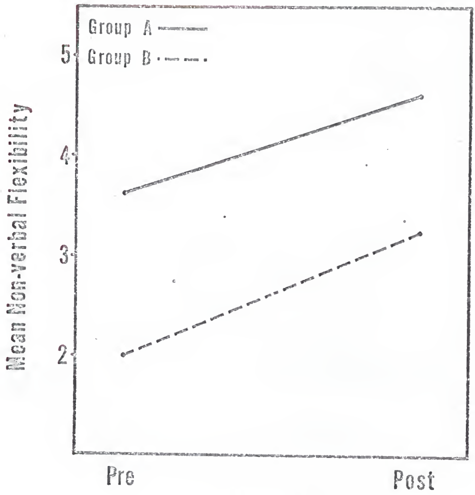

Figure 3

Changes in Mean Non-verbal Flexibility Scores for Groups A and B

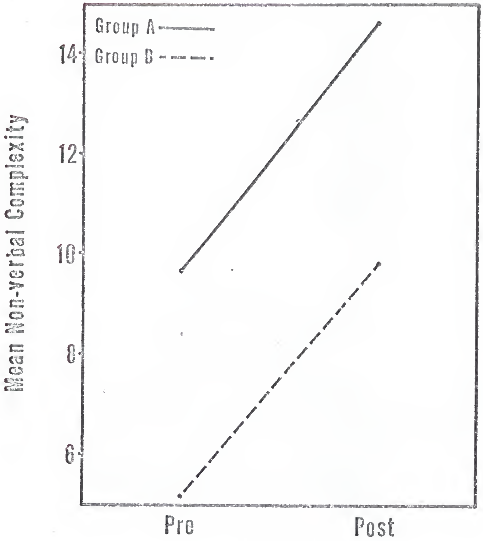

Figure 4

Changes in Mean Non-verbal Complexity Scores for Groups A and B

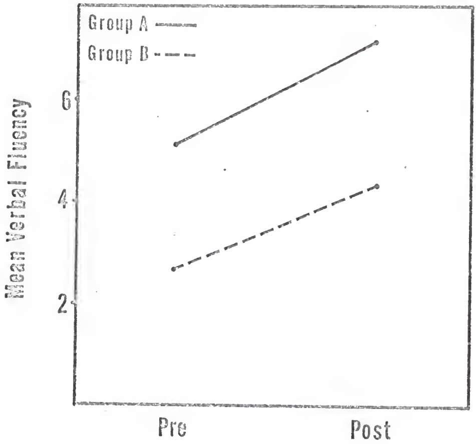

Figure 5

Changes in Mean Verbal Fluency Scores
for Groups A and B

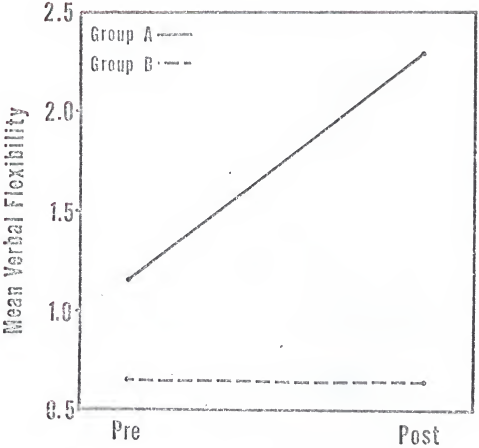

Figure 6

Changes in Mean Verbal Flexibility Scores for Groups A and B

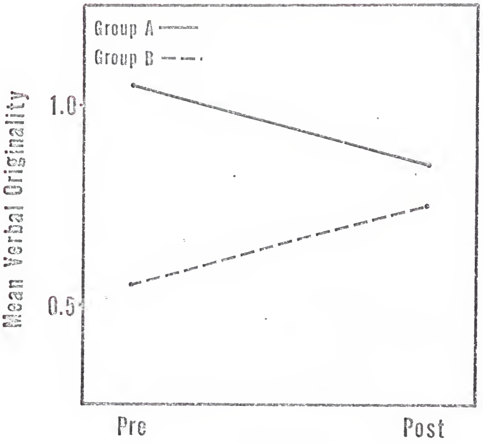

Figure 7

Changes in Mean Verbal Originality Scores for Groups A and B

The tendency for the Learning to Learn program to benefit some aspects of creative functioning more than the traditional kindergarten can be illustrated by the following result. The children in the Learning to Learn group scored significantly higher than the traditional group on the pre-treatment testing of nonverbal complexity. Both groups improved significantly on the post-treatment testing. But with the pre-treatment influence removed by the convariance analysis, the Learning to Learn group still scored significantly higher than the traditional group on this variable. The other significant post-treatment difference obtained reveals that the Learning to Learn group improved on verbal flexibility while the traditional group obtained exactly the same mean score on the post-treatment testing

A look at the variances provide interesting clues as to the fundamental nature of these data. Table V shows the results of the _F_ test of equal variances between pre and post-treatment measurements of the creativity variables. The Learning to Learn group increased in the variability of its performance significantly on nonverbal fluency, verbal fluency, and verbal flexibility. By contrast, the traditional group increased in the variability of its performance significantly on only IQ and nonverbal flexibility.

These results suggest that both programs may have felicitous and detrimental effects on particular aspects of their participants' intellectual and creative performance.

TABLE V

F TEST FOR EQUALITY OF VARIANCES BETWEEN PRE AND POST MEASURES FOR GROUPS A AND B

	Variances			
Group A	Pre	Post	*F*	*p*
Stanford-Binet IQ	93.90	122.10	1.30	n.s.
Nonverbal Fluency	1.90	4.20	2.22	.05
Nonverbal Flexibility	5.52	6.76	1.23	n.s.
Nonverbal Complexity	19.89	18.25	.90	n.s.
Verbal Fluency	11.10	41.35	3.80	.01
Verbal Flexibility	1.70	11.20	6.48	.001
Verbal Originality	1.44	.53	.37	n.s.

Degrees of Freedom = 19 N = 20

Group B	Pre	Post	*F*	*p*
Stanford-Binet IQ	69.70	163.80	2.35	.05
Nonverbal Fluency	2.20	4.20	1.91	n.s.
Nonverbal Flexibility	2.00	6.30	3.15	.05
Nonverbal Complexity	15.20	28.50	1.84	n.s.
Verbal Fluency	11.50	14.70	1.28	n.s.
Verbal Flexibility	1.90	.81	.42	n.s.
Verbal Originality	2.00	.60	.33	n.s.

Degrees of Freedom = 19 N = 20

The Learning to Learn program seems to have positive and negative effects on the participants' performance on the verbal creativity measures. It seems to have primarily positive effects on their performance on the nonverbal measures. The children in the traditional group seemed to be both helped and hindered on IQ and nonverbal flexibility. On the latter variable, however, only one child obtained a lower score on the post-treatment measurement. The differences in variance stem from two facts: half of the sample obtained the same score as on the pre-treatment measurement, while the other half improved, and the range of scores on the pre-treatment measurement was very restricted. On the Stanford-Binet, however, 11 of the 20 subjects in Group B did worse on the post-treatment measurement.

In the search for predictor variables which discriminate those who improved from those who did worse, sex, and post-treatment IQ measures did not discriminate. In fact, no sex differences of any kind were obtained.

Tables VI and VII exhibit a 14 x 14 variable intercorrelation matrix of all pre and post-variables. No outstanding trends were indicated in the matrix; there were several spuriously high correlations due to artifacts in the measurements of fluency and flexibility variables.

TABLE VI

INTERCORRELATION MATRIX FOR ALL PRE AND POST IQ AND CREATIVITY VARIABLES FOR GROUP A

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1														
2	66													
3	59	77												
4	55	32	61											
5	25	12	23	02										
6	23	16	12	-10	83									
7	37	15	29	37	22	06								
8	80	49	41	29	10	06	20							
9	-01	13	33	21	08	-13	28	14						
10	28	37	40	10	15	02	18	43	81					
11	26	24	21	05	-05	07	-05	22	12	41				
12	41	66	77	36	-02	-07	36	34	56	50	-04			
13	38	58	68	33	-02	-10	46	39	60	55	12	87		
14	-21	-24	-01	01	-20	-40	29	-08	-11	25	04	-10	-10	

1 = Pretreatment IQ

2 = Pretreatment Nonverbal Fluency
3 = Pretreatment Nonverbal Flexibility
4 = Pretreatment Nonverbal Complexity

5 = Pretreatment Verbal Fluency
6 = Pretreatment Verbal Flexibility
7 = Pretreatment Verbal Originality

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8 = Post-treatment IQ

9 = Post-treatment Nonverbal Fluency
10= Post-treatment Nonverbal Flexibility
11= Post-treatment Nonverbal Complexity

12= Post-treatment Verbal Fluency
13= Post-treatment Verbal Flexibility
14= Post-treatment Verbal Originality

TABLE VII

INTERCORRELATION MATRIX FOR ALL PRE AND POST IQ AND CREATIVITY VARIABLES FOR GROUP B

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1														
2	57													
3	59	65												
4	48	25	60											
5	-03	-02	07	-09										
6	-06	04	03	-08	82									
7	21	10	25	18	36	20								
8	58	36	51	47	09	-02	30							
9	59	58	62	49	-11	-03	49	34						
10	53	54	70	40	-08	-09	53	30	84					
11	09	15	42	32	-21	-12	00	14	36	64				
12	30	39	46	50	-16	-07	14	40	51	42	33			
13	45	70	58	45	-20	-10	30	33	83	70	39	51		
14	28	14	28	47	40	39	26	12	24	16	01	20	02	

1 = Pretreatment IQ

2 = Pretreatment Nonverbal Fluency
3 = Pretreatment Nonverbal Flexibility
4 = Pretreatment Nonverbal Complexity

5 = Pretreatment Verbal Fluency
6 = Pretreatment Verbal Flexibility
7 = Pretreatment Verbal Originality

8 = Post-treatment IQ
9 = Post-treatment Nonverbal Fluency
10 = Post-treatment Nonverbal Flexibility
11 = Post-treatment Nonverbal Complexity

12 = Post-treatment Verbal Fluency
13 = Post-treatment Verbal Flexibility
14 = Post-treatment Verbal Originality

The intercorrelation matrix did, however, provide data on the reliability of the measures; that is, a confounded estimate of the stability of the measures was obtained by correlating the pre-treatment measurement of the variables with their corresponding post-treatment measurements. The estimate was confounded because a treatment was interposed between the two measurements, and, therefore, changes in performance was reflected in the correlations between pre and post-measurements. For Group A, very low correlations obtained between pre and post-measures of verbal creativity as well as for pre and post-measures of nonverbal complexity. But these are precisely the variables for which the variances were presumably most affected by the treatment. Group B, however, showed low correlations also for the verbal measures. In lieu of an independent measure of reliability, the possibility that the verbal measures were unreliable must be frankly admitted. The effect of such a possibility of unreliability, may not be so negative as one might imagine. Bereiter (1963) maintains that unreliable measures tend to be less sensitive to significant group differences, implying that a significant difference obtained with such measures is probably a valid difference.

The only other measure of reliability obtained was rater reliability for the two judges' ratings of the originality of the children's stories. Both pre and post-treatment measurements revealed reliabilities in the 90's.

In summary, the first hypothesis was only partially supported. There were significant differences between the groups on the post-treatment testing on the Stanford-Binet, but only Group A improved on this measure over time. The second hypothesis also received only partial support. Group A scored significantly higher on only two of the six creativity variables on the post-treatment administration. The third hypothesis was partially supported for both groups. Group A improved significantly on only nonverbal complexity. Group B improved significantly on the measures of nonverbal flexibility and complexity.

DISCUSSION

This exploratory research certainly has its limits. The small number of subjects in each group, the non-definitive measures, and the "packaged" way in which the experimental treatment was defined, limit not only the generalizations that can be made, but also the inferences which are possible from this sample. It is within the boundaries of these limitations, however, that the interpretation of the results will be made.

The results show that the Learning to Learn program contributed to the expected increase on the IQ metric. Group A averaged a ten point gain on the post-treatment testing, a result which is often reported in the literature (Jensen, 1969). With this result in mind, we once again raise the central issue of this study--does this special learning program enhance creativity as well as IQ or does it raise the latter at the expense of the former? The results of this study unfortunately provide no simple answer. Instead, it appears that for Group A, aspects of creative performance improved over time, but the same mixed result was found for the traditional Group. Yet there were aspects of creative performance in which the Learning to Learn group was superior to the traditional group on the post-treatment testing. Thus, there is some evidence suggesting that the Learning to Learn program tends to be more effective in augmenting at least some aspects of the creative performance of its students than the traditional program.

Another paradoxical result is that the test scores on verbal creativity indicate no improvement over time for both groups even though one verbal variable showed the Learning to Learn group to be significantly higher than the traditional group on the post-treatment testing. This result qualifies any statement which attests to the superior ability of the special learning program to enhance creative functioning.

The most perplexing and least understood result, however, is that the Learning to Learn program seems to enhance creative performance for some children and hinder it for others. In some cases, an individual child improved on some of the measures and did worse on others. The increased variability of performance for Group A was most striking in the case of the verbal measures, and it is these same measures whose reliability has been questioned. Therefore, one possible explanation of the increased variability obtained on these measures may be that the measuring instruments provide no consistent estimate of verbal creativity. But if we question the reliability of the instruments, it is fair to ask why no such increase in variability was found for the traditional group, since the same measures were used to estimate the creative performance of this group. The same unreliable measures administered to both groups should have yielded similar increases in the variability of creative performance.

As was mentioned earlier, there seems to be no systematic influences due to age, sex, IQ, or pre-treatment performance which can explain why some children improved on the verbal measures and others did worse. Something idiosyncratic and individual seems to exist in the relationship between an individual child and the Learning to Learn program. The interactions which ensue when an individual child brings his unique set of needs and past experiences into a special learning program may well lead to idiosyncratic responses to the program. If this is so, we are as yet unable to throw any light upon this process. Perhaps the idiosyncracy comes at the time of post-treatment testing, at which, faced with the same tests, children are most likely to show shifts in mood, interest, and commitment to the tasks. This appears to be especially true with the story-telling task. Several children who were quite verbal and elaborate in fashioning stories on the pre-treatment testing, refused to offer any story on the second testing. Open-ended, verbal measures seem particularly vulnerable to this possibility, because the choice is actually the child's whether or not he offers any response to the task. And whether or not a child becomes verbal is so very subject to the immediate conditions of the encounter with the experimenter.

It is interesting to note that Lenrow (1967) found a similar increase in the variability in the performance of the subjects in his Convergent Training Group. Some children increased their divergent mode performance while others decreased. The Learning to Learn program does have, in Lenrow's sense, a convergent bias, and it produced similar results on divergent measures. Lenrow was not able to account for this result, and, as is the case here, was unable to predict which children would improve and which would do worse on the measure of divergent coping. One possible explanation may be that our measures of divergent thinking are actually sensitive to two kinds of divergent of creative performance and that one kind tends to be helped and the other hindered in special learning programs with a convergent bias. The children who were helped by the Learning to Learn program may possess a particular kind of creative potential which can be benefited in such a program while those who did worse upon post-treatment testing may possess creative potential which thrives in a more open-ended type of program. What the nature of this difference is lies beyond both the measuring instruments employed and the author's present explanatory ingenuity.

The systematic differences that were found are tentatively attributed to differences in the two curricula, and it is the attractive prospect of future research to tease out the specifics of the Learning to Learn curriculum which are responsible for these differences. For the present, we may entertain some hypotheses which serve as both possible explanations of the present data and as guides for the design of future research.

The systematic differences with which we need to concern ourselves appear on the nonverbal complexity and verbal flexibility variables. What these variables have in common is that high scores on both suggest that a significant elaboration of a child's experience has taken place. On the complexity task, it may mean that a child is able to process at a sensory level more environmental unpredictability (Munsinger, Kessen and Kessen, 1964). On the verbal flexibility task, it suggests that a child has increased his capability to change a verbal set. The higher scores obtained by the Learning to Learn group indicate that they are better able to flexibly associate categories of verbal response.

Any attempt to infer one-to-one relationships between specific tasks of the Learning to Learn program and the specific increases on the creativity variables would be both premature and oversharp. Hence we will speak in terms of general emphases of the curriculum.

It is relatively clear from the observations of the classrooms made during the middle of the school year, and the verbal statements of the two programs that such differences exist. There is clearly more opportunity for a child in the Learning to Learn program to engage in his own individual projects, to intensely interact on a verbal level with both adults and children, to experience a more systematic approach to teaching concept formation, and to develop a faith in his own powers of observation and thinking. Although these differences in opportunity are relative, they may well be responsible for the obtained differences. These curricular emphases are reflected in Sprigle's notion of "active learning" in an atmosphere in which there is intense verbal interaction. These particular emphases may be responsible for the motivation and development reflected in the differences obtained. A future research project might well define more clearly these emphases in operational terms and develop measures of creative performance which are more sensitive to the effects of these emphases.

The fact that some children obtained lower scores on the post-treatment measures suggests that the Learning to Learn program may also possess features which tend to stifle creative performance. In the discussion of what constitutes a fostering ethos for creativity, it was suggested that an atmosphere of playfulness was integral for enhancing creativity. Such an atmosphere contains relatively little pressure on the child to achieve any predetermined goal. While at times such an atmosphere may be achieved with the Learning to Learn program, the program is still imbued with a sense of mission. The seriousness of this mission, to improve the cognitive skills of disadvantaged Negro children may well temper any tendency to create an atmosphere of playfulness. The goals of the program are too clear, the support for it too tenuous, to allow for the relaxation of any pressure on the children to achieve.

The issue of structured programs must also be dealt with. It is actually too early to imprecise to determine the specific effects of highly systematized programs or curricula on later creative performance. The results here suggest that it is not structure _per se_ which may stifle, or for that matter enhance creativity; it is rather the nature of the structure built into the program which determines the program's beneficial or harmful impact on a child's creativity. The Learning to Learn program is clearly designed to develop the well-ordered mind in which clear thinking is paramount. The research on creativity suggests that something else is involved in creativity besides the logical, convergent thinking operations. Dellas and Gaier (1970) suggest that in the last analysis, it is not intellectual factors, but rather personality factors which distinguish the more from the less creative individual. Such factors as openness to one's experience, lack of impulse and imagery control by means of repression, and a relative lack of defensiveness are those which are frequently reported as characteristic of the creative personality. Thus, it may be in the area of personality development that structured programs may realize a negative or stifling impact upon creativity. This should be the subject of yet another study involving a special learning program.

The data in this study are not what are typically thought of as hard data. Consequently, this study does not serve as research which establishes definitively the merits and demerits of a special learning program for the creative performance of disadvantaged Negro children. Yet in this study has appeared intriguing clues as to what may well be the factors comprising a fostering ethos for the elusive and sometimes evanescent phenomenon of childhood creativity.

CONCLUSIONS

The tentative conclusions drawn from this research, are stated with a keen awareness of the limitations on such conclusions imposed by the problems of control encountered by the experimenter. Within the framework of these limitations it seems fair to conclude that the Learning to Learn program appears to enhance the performance of its participants on only a few measures of creativity employed in this study. The program seems to achieve this to a significantly greater extent than the traditional kindergarten program; in no instance did the traditional group score significantly higher than the Learning to Learn group on the post-treatment testing.

The Learning to Learn program also appears to have both positive and negative effects on the creative performance of its participants. This result is particularly striking for the measures of verbal creativity. As yet there seems to be no good explanation to account for it.

In general, the Learning to Learn program appears to be more affective in enhancing the intellectual performace of its participants than in augmenting their creative performance. Thus, there may well be aspects of the structure of the program which benefit cognitive functioning at the expense of creative functioning. It is speculated that the relative lack of a playful atmosphere in the Learning to Learn program and the influence of its systematized curriculum on personality development may be the key aspects of the program which could impede the development of creativity in children.

The potential facilitators of the program may include concrete applications of the notion of active learning, the more intense verbal atmosphere, and the emphasis on the child's developing faith in his own powers of observation. Future research should focus on the potential facilitators and inhibitors of a child's creative performance which the program appears to contain.

SUMMARY

A special Learning to Learn program was compared with a traditional kindergarten for its impact on the creative performance of disadvantaged five-year-old Negro children. Forty children from Jacksonville, Florida, were divided into two groups of equal size, one group participating in the Learning to Learn program and the other in a traditional kindergarten. IQ and creativity measures were administered at the beginning and end of the 1968-69 school year. During the middle of the school year, each class in which the subjects participated was observed for any differences that existed in the classroom situations.

It was hypothesized that both groups would improve on all measures over time, but that the Learning to Learn group would score significantly higher on these measures than the traditional kindergarten group at the end of the school year. The results were not so simple. Only the Learning to Learn group improved on the IQ metric; this group also scored significantly higher than the other group on only two of the six creativity measures. Furthermore, the Learning to Learn group improved over time significantly on only one creativity measure, while the traditional group improved significantly on two creativity measures.

After acknowledging the limits on generalization imposed by problems of control, it was concluded that the Learning to Learn program tends to enhance some aspects of the creative performance of its participants more than the traditional kindergarten. It was noted, however, that the Learning to Learn program had both positive and negative influences on the creative performance of its students. The results were discussed in terms of the possible facilitating and debilitating features which the program may possess for the creative development of disadvantaged Negro children.

APPENDICES

APPENDIX A

INSTRUCTIONS FOR THE ADMINISTRATION AND SCORING OF THE CREATIVITY MEASURES

Tinker Toy Test

Twenty pieces from the Tinker Toy Set (12 rods, 4 spools, 2 flaps, and 2 nozzles) are placed before the child, and he is instructed to make any design he wishes with any number of pieces he cares to use. He is told that he may make as many designs as he wishes and that when he is tired or wants to stop to let the experimenter know. The test yields measures of three creativity factors, fluency, flexibility, and complexity. Fluency is measured by the number of designs a given child makes. Flexibility is measured by structural changes exhibited from one design to the next. Here there are three possible scores, 0, 1, or 2. A zero score indicates that a child's subsequent design possesses exactly the same structure as its predecessor. A one point score is given to the succeeding design if it possesses basically the same structure as the preceding design, but is elaborated in some way which makes it perceptively different. A two point score is given if the subsequent design is structurally different from the preceding one. Although the scoring of structural difference is ultimately subjective, some objectivity is maintained by noticing the different geometric planes a given structure intersects. Thus, if the structure of one design intersects two planes and the subsequent design intersects three, a perceptible difference in structure is noticed and the second design is given a score of two. Likewise, if one design intersects three planes and its successor intersects only two, a score of two is assigned. For ease in scoring, one point is automatically assigned to a child's first offering.

Just Suppose Test

The child is shown a picture of clouds with strings hanging down from them to the earth. The drawing appears in a booklet entitled Thinking Creatively With Words, which is part of the Minnesota Tests of Creativity. The child is instructed to look at the picture while the experimenter says, "Just suppose clouds had strings hanging from them down to the earth, what might happen if clouds had strings?"

Verbal fluency and flexibility scores are obtained in the following way: the number of different experimenter-rated adequate responses constitutes the fluency score. An adequate response is leniently determined, but typically refers to any stated possibility which can be related to the fact that clouds have strings. Thus, if a child responds that a house may fly away, his response does not relate to the fact that clouds have strings and therefore would not be rated as adequate or acceptable. If, on the other hand, the child responds that he could climb to the clouds, his response is rated as adequate. Flexibility is scored on the basis of the number of different categories of events that a child generates.

The second part of this task involves asking the children to stretch their arms and legs as far as they can. The experimenter then asks, "Just suppose we could stretch our bodies in any way or direction we wanted to, what are some things we could turn ourselves into?" Almost any transformation of shape and size is rated as adequate; hence fluency is measured by a straight count of responses. Flexibility is again measured by the number of different categories of transformations stated. The fluency and flexibility scores achieved on this test are added to the fluency and flexibility scores on the Unusual Uses Test.

Unusual Uses Test

In this task, the child is shown a shoe and an ash-tray and are asked what the typical use is of each object. Then the experimenter asks, "Can you think of some different ways we might use a shoe (ashtray)?" The number of different uses stated constitutes the fluency score. The number of different categories of uses stated designates the flexibility score. Adequacy is determined by the relation of the stated use to the shape of the object. Thus, for example, if a child says that he would use a shoe for a balloon, this would be an inadequate response. If he says that he would use a shoe for a hammer, that would be an adequate response. As mentioned before, the fluency and flexibility scores achieved on this test is added to the fluency and flexibility scores on the Just Suppose Test.

Imaginative Stories

In this task, the child is instructed to tell the most interesting and exciting story he can about one of two topics. One topic involves a little boy or girl who does not get his or her supper one evening; the other topic focuses on a child finding a bag of money in the street. The topics are thought to reflect distinct possibilities in the lives of the children. The ratings of the stories provide the only measure of "originality," the third verbal creativity variable. The basis for the ratings are: the number of characters in the story; the number of incidents; whether or not there is dialogue; the novelty of the story line; and the continuity of the story line. With these five factors in mind, stories were rated independently by two judges on a seven point scale of originality.

APPENDIX B

CLASSROOM OBSERVATIONS

Format of Observations

The classroom observations involved a three-hour period of observation for each classroom. Since the subjects in Group B were actually situated in two different classrooms, two sessions of observation were necessary for this group. It is to be noted that while each traditional kindergarten class employed only one room, the Learning to Learn program utilized three rooms. The programs were observed for differences in group structure, group process, and teacher characteristics. In general, the Learning to Learn classroom exhibited striking differences from the traditional kindergarten classrooms in terms of both structure and process; there were fewer differences exhibited in specific teacher characteristics.

Group Structure

By group structure, the author means the ways in which students were arranged, how often they were taught as a group, and how much individualized instruction was planned into the daily schedule. For example, the Learning to Learn classroom exhibited fewer group activities during the period of observation than did the traditional classrooms. There was, of course, some overlap in activities as in the morning circle in which the children in both programs grouped for opening exercises and games. But in the traditional kindergartens, there were only group activities periodically interrupted by free play during which little teacher-child interaction took place. The Learning to Learn program had group activities, free play, individualized projects, and special small groups. Each structure allowed for different intensities of teacher-child interaction and, for that matter, child-child interactions.

Group Process

Because fewer group activities took place in the Learning to Learn program, the experimental teachers spent much less time and energy in controlling the behavior of individuals which disrupted the group process. In both programs, the children varied in attention spans; consequently, during the group activity, many children would often focus their attention upon events other than the group activity, and frequently would attempt to gain the attention of the other group members. The teacher would then have to interrupt her teaching to quell the disruption. It did appear, however, that the children in the Learning to Learn program were less disruptive during the group activities. Perhaps, they were able to channel their energy and boisterousness in those more frequent periods of free play and individual projects during which disruptions were more laxly dealt with. During these periods, the experimental teachers would come to each child and engage in a fairly intense verbal interaction while providing some help with his project. Except during the group activities, there seemed to be a great range of noise and disruption tolerated and generally less concern was given over to behavior control. At times, in fact, the teachers were too slow in responding to a conflict, which would break out into physical hostility between disputing children.

Another striking departure in process in the Learning to Learn program involved those periods during which the teachers would work with small groups of children on the evolution of a concept. During free play, four children would be selected and escorted to a second classroom, and, in this room, with appropriate props, the teacher would work intensively on the concept of the day. On the observation day, the groups were working on the concept on transportation, and the teacher actively utilized the observations of the children to lead them to larger and larger generalizations until they could grasp the concept of transportation and see its relationships to the concrete experiences of particular vehicles and their functions. The teacher began by placing several trucks in a square area. She then attempted to get the children to categorize from their experience and observations: they all have wheels; they all go; they all can carry things; they all have lights, steering wheels. Systematically, she led them from these concrete observations to the abstract commonality of transportation.

There was nothing like this in either of the traditional kindergarten classrooms. In these classrooms, the characteristic task presented to the children was an identification task. For example, one teacher was attempting to teach dates. She began by asking what day it was. The children called it out in unison. Then she presented a calendar for the month of February and a pile of numbered cardboard squares. She asked particular children to find the number 21 in the pile. The first child had difficulty finding it hence about ten children came to help. The teacher then selected one child to hang the number on the calendar. Then the identification task proceeded to a description of the day and a study of a thermometer where a similar procedure was employed.

Teacher Characteristics

All the teachers observed appeared to be warm, patient, and enthusiastic, but the experimental teachers seemed to be cognitively sharper than the kindergarten teachers. They seemed to interact more frequently and much more intensely, trying to convey to the children the power and magic of words. At times they employed a variation of the Socratic method, constantly questioning the children about their observations and their relationships. They may also have possessed higher expectations for the children because they were in a special program.

By contrast, the traditional kindergarten teachers seemed clumsy in their explanations of concepts, and quite often their explanations were not very elaborate. Unfortunately, teacher differences were not appraised in any more systematic way than naturalistic observation. One period of observation can reveal nothing definitive, but it did provide evidences of differences in curricular emphases, and in the quality and quantity of teacher-child interactions.

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BIOGRAPHICAL SKETCH

Barry E. Wolfe was born January 16, 1942, at Washington, D.C. In June, 1959, he was graduated from Calvin Coolidge High School, Washington, D.C. He received the degree of Bachelor of Science with a major in psychology from Howard University, Washington, D.C., in June, 1963. Between 1963 and 1965, he did graduate work in Clinical Psychology at the University of Illinois. From 1965 to 1967, he worked as a Research Psychologist GS-9 in the Laboratory of Psychology at the National Institute of Mental Health, Bethesda, Maryland. In September, 1967, he enrolled in the Graduate School of the University of Florida. He received the degree of Master of Arts from the University of Florida in 1968. In June, 1970, he received the degree of Doctor of Philosophy. Upon graduation, he will begin his professional career as a Clinical Psychologist at the Counseling Center, Michigan State University.

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This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all members of that committee. It was submitted to the Dean of the College of Arts and Sciences and to the Graduate Council, and was approved as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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